

THE EMBODIMENTS OF THE INVENTION IN WHICH AN EXCLUSIVE PROPERTY OR PRIVILEGE IS CLAIMED ARE DEFINED AS FOLLOWS:

1. A method for diagnosing doubling in a multistage rotary machine, said rotary machine  
5 having one or more stages, each of said stages having one or more rotary components, said method comprising the steps of:
  - receiving one or more signals from sensors at each of said rotary components;
  - generating a current error matrix by comparing corresponding ones of said signals  
from each of said stages; and,
  - 10 comparing said current error matrix to at least one stored error matrix to identify one of said rotary components having a largest difference between said current and stored error matrices.
2. The method of claim 1 wherein said stored error matrix is a time-sequence of stored error  
15 matrices.
3. The method of claim 2 and further comprising the step of comparing said current error matrix to a predetermined tolerance.
- 20 4. The method of claim 3 and further comprising the step of, in response to said step of comparing said current error matrix to a predetermined tolerance, updating said stored error matrix with said current error matrix.
5. The method of claim 1 wherein said signals are digital signals.  
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6. The method of claim 5 and further comprising the step of filtering said signals to reduce predetermined frequency components.
7. The method of claim 6 and further comprising the step of filtering said current error  
30 matrix to reduce predetermined frequency components.

8. The method of claim 1 wherein said multistage rotary machine is a printing press.

9. The method of claim 8 wherein said stages are printing units.

5 10. The method of claim 9 wherein said rotary components include gears and rollers.

11. The method of claim 10 wherein said current error matrix is a current rotation synchronization error matrix and said stored error matrix is a stored rotation synchronization error matrix.

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12. The method of claim 1 wherein said signals include signals indicative of speed, position, tension, rotary momentum, and acceleration.

13. The method of claim 1 wherein said sensors include magnetic pickups, proximity probes,  
15 accelerometers, tensiometers, and rotary momentum detectors.

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